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Vertigo and dizziness: a study of relationships to audiological testing and patient history data

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VERTIGO AND DIZZINESS: A STUDY OF RELATIONSHIPS TO AUDIOLOGICAL TESTING AND PATIENT HISTORY DATA

By

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INTRODUCTION

BACKGROUND

The most outstanding symptom of vestibular malfunction is vertigo or dizziness. According to Spector (1967), "The term dizziness is used . . . in the broad sense of any unpleasant sensation of disturbed relationship to surrounding objects in space." The term "vertigo" is "an experience in which the patient has the sensation that his surroundings are whirling about him" (objective vertigo) "or that he himself is whirling in space" (subjective vertigo). Williams and Corbin (1958) have also found it necessary to make a semantic distinction between the terms "dizziness" and "vertigo." They state,

> Vertigo in the strict sense is a sensation that the outer world is moving about the person [objective vertigo--eyes open] or that the person himself is whirling in space [subjective vertigo]. Dizziness, on the other hand, is a sensation of movement within the head. Vertigo and dizziness may coexist.

For the purpose of this study, the terms "dizziness" and "vertigo" will be discussed in reference to the above definitions with the understanding that the term "dizziness" is most commonly used by the layman to describe all of his general symptoms of space disorientation. The specialist

also often uses the term "dizziness" to communicate with a patient on a common ground of understanding even though the specialist is, in fact, differentiating between "dizziness" and "objective" or "subjective" vertigo. In this study the author will use the lay term "dizziness," until such time as the data is more conclusively developed and the terminology referring to the various possible sub-classifications can be specifically separated and defined.

The sensation of dizziness is always described by the patient. The patient describes or physically demonstrates his mild to severe symptoms of unsteadiness, visual disorientation, or discomforts of equilibrium related to his conscious surroundings. Causative factors may include a history of trauma, allergy, middle or inner ear disease, or, as attested to in a significant number of studies, psychosomatic illness. In severe attacks hospital care is sometimes a necessity. The patient may be unable to tolerate any positional change and will require medication not only for incapacitating dizziness accompanied by severe nausea, but for the anxiety brought about by those symptoms.

Professional diagnostic confirmation of the etiology of dizziness usually includes numerous tests, many of which indirectly survey the functioning of the vestibular mechanism. Among these are several methods of caloric testing, direct observation of nystagmus, electronystagmographic studies, and vestibular function studies. These

studies, used collectively or individually, will often indicate normal or abnormal vestibular function to the examiner. It must be noted that dizziness may not only result from direct pathological accident to the middle or inner ear, but from other etiologies: cardiac, gastric, or occular disorders; from some peripheral irritation or as a precursor of an epileptic seizure. Dizziness has also been linked to toxemias (as in Bright's Disease), organic brain damage, or, as previously mentioned, from undefinable origins.

Most authorities agree that an important cause of non-psychosomatic dizziness is vestibular malfunction and audiologic tests are frequently included in the primary diagnostic work-up due to the close association of the vestibular and cochlear mechanisms.

There is relatively little information concerning the relationship of audiologic tests to dizzy patient history and especially to the Classification[1] and Types[2]

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[1] In this study Classification is defined as the whole of three categories: (1) Peripheral Classification--the outer, external, or distal physiology; (2) Central Classification--denoting that part of the nervous system consisting of the brain and spinal cord; and (3) Other Classification--different or distinct from those influences referred to or implied in the Central or Peripheral categories.

[2] Types are defined as sub-classifications pertaining to the patient's own description of certain phenomena of his dizziness. (1) Objective dizziness--the person feels that the outer world is moving around him.

of dizzy symptoms the patient exhibits. Spector (1967), DeWeese and Saunders (1968), and Wolfson (1965) have been able to relate certain audiologic tests to specific diseases that include the symptom of dizziness. These diseases include acoustic neuroma (high frequency hearing loss, marked tone decay, and low discrimination score), acute suppurative labyrinthitis (perceptive hearing loss), peri-labyrinthitis (mixed hearing loss), toxic vertigo (in some cases, high-frequency deafness), and arteriosclerosis (frequently presbycusis). The most outstanding audiologic "dizzy disease" is Menieres Disease. Early in the disease audiologic test results often show a fluctuating low-frequency perceptive hearing loss, diplacusis, recruitment and a high SISI score with moderate reduction in discrimination. In later stages, the hearing loss becomes more severe; sometimes profound, particularly in the high frequencies, and does not return to normal. Such information has been found to aid in diagnosis of this specific disease, but on the whole there is a lack of information concerning an overall relationship, if any.

It is general knowledge that certain audiologic tests may aid in confirming a specific etiology. However,

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(2) Subjective dizziness--the person feels that he himself is whirling in space. (3) Dizzy--a sensation of movement in the head; lightheadedness.

there seems to be no relevant information concerning dizziness as a Classification or Type unto itself, and further to relate it to pertinent descriptive and audiologic results. Winchester (1966) has stated,

> I have not been able to determine or to find any recurrent pattern of a pure tone audiogram, for example, that would correlate well with varying types of vestibular disorders. There just doesn't seem to be much of a correlation there.

This seems to be a generalized statement which has as its greatest value the indication of need for further research.

Therefore, it was the intent of this study to determine if, or to what extent, six selected audiologic tests show relationships with questions or clusters of questions presented in a Dizzy Patient Questionnaire. It was also the intent of this study to relate Classification and Types of dizziness information obtained from the Dizzy Patient Questionnaire with normal-abnormal results of the six audiologic tests.

The Dizzy Patient Questionnaire used in this study was originally designed by J. Sheehy, House Otological Group, Los Angeles, California, to enable a patient to describe his symptoms of dizziness and to elicit some background information which might be relevant to his symptoms (age, habits, allergies, etc.). The Dizzy Patient Questionnaire has been slightly altered for this study to eliminate short essay questions and to convert

the questionnaire to 38 yes-no questions. In this writer's opinion, there have been no fundamental changes made from the original. An example of the original Dizzy Patient Questionnaire is included as Appendix A of this paper. The Revised Dizzy Patient Questionnaire, as used in this study, is included as Appendix B.

In testing dizzy patients, the following were the audiologic tests of choice due to their availability, their standardization, and the wide extent of information that could be derived from the completed results. They were:

a. pure tone air conduction
b. speech reception threshold
c. speech discrimination (Phonetically Balanced Words, List W-22)
d. pure tone bone conduction
e. SISI (Short Increment Sensitivity Index)
f. tone decay (Rosenberg [1958] method)

Another test of choice would have been Bekesy audiometry. However, equipment was not available to the investigator, and consequently this data was not used.

From the audiologic normal-abnormal results and the Dizzy Patient Questionnaire information, the investigator attempted to describe Classification and Types of dizziness in relation to the following questions:

(1) Can the complaint of dizziness be classified into three categories of "Peripheral," "Central," or

"Other" symptoms relating to the physiological histories of a mixed, all female or all male sample?

(2) Can the complaint of dizziness be sub-classified into Objective, Subjective, or Dizzy Type relating to personal descriptions of dizziness by a mixed, all female or all male sample?

(3) Is there a relationship between normal-abnormal audiologic results obtained on any of the six audiologic tests and specific Classification and Type groupings in the Dizzy Patient Questionnaire?

If specific Classification, Type, audiologic, and sex trends are apparent, it is believed that this information would be useful in aiding the Audiologist or Otologic specialist in the identification of a true (non-psychosomatic) dizziness and/or vertigo.

Chapter 2

PROCEDURES

EXPERIMENTAL DESIGN

The primary data for this investigation was obtained in the professional office of Dr. C. J. Abdo, Jr., Otolaryngologist, 2300 Rancho Drive, Las Vegas, Nevada. All audiologic tests pertaining to subjects in this study were administered by the author during approximately 27 months of employment as a clinical audiologist in this office.

Subject inclusion in the study was based only upon the patient's presenting an initial complaint of dizziness. There was no attempt to refine the subject sample beyond this criterion. If the patient's complaint was dizziness, he was requested to complete the Dizzy Patient Questionnaire and was scheduled for the full six-test audiologic battery.

When presented with the Dizzy Patient Questionnaire, the patient was instructed to fill out the questionnaire completely and to the best of his or her ability. A staff member stayed in attendance to answer questions and to clarify meaning if the patient so requested. After

completion of the questionnaire, it was checked for omitted answers. No questionnaire was acceptable for this study if the patient could not put a definite "yes" or "no" judgment on questions of particular relevance.[3]

Each patient's Dizzy Patient Questionnaire was reviewed, defined, and counted as to a total of "yes" answers in each Peripheral, Central, and Other Classification category.[4] The Classification definition depended upon the total of "yes" answers in either the Peripheral, Central, or Other category. Types of dizziness were defined according to subject answers to certain questions[5] contained in the Dizzy Patient Questionnaire.

A subject was eliminated from the study if, in totaling the positive answers in each of the Peripheral, Central, or Other categories of Classification, equal

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[3]Appendix B, Section I, questions 1 through 11; Section II, questions 1 through 4, 6 through 9, 12 and 14; Section III, questions 1 through 7; Section IV, questions 1 through 8.

[4]Classification questions had been previously evaluated for Peripheral, Central, or Other definition by permanent staff members of the Speech and Hearing Clinic, University of Montana. Four Ph.D.'s and two Master's in Speech Pathology and Audiology, and an Otorhinolaryngologist evaluated each question in the Dizzy Patient Questionnaire. A five out of seven agreement by this group was reached for each question. Questions and their Classification group are included as Appendix B and C.

[5]Type questions did not require further definition other than the patient's "yes" or "no" answers to Part I, Appendix B.

totals resulted, i.e., a tie (Appendix C). One category of Classification was necessary in order to specifically identify a certain Classification trend for each subject. In addition, a subject was eliminated from the study if all of Part I[6] (Appendix C) was answered negatively. This particular section dealt with the patient's description of his Types of dizziness. If he could not describe his dizziness, as per Objective and/or Subjective and/or Dizzy Types, dizziness for that subject could not be established and therefore was not allowed to serve as a subject for this project.

This investigation originally included 72 subjects who had completed the Dizzy Patient Questionnaire and who had undergone the six-test audiologic battery. Due to incomplete questionnaires, failure to complete the audiologic tests, or, as in five instances, equal totals in two of the Classification categories, 10 of the original potential subjects were eliminated. Therefore, 62 subjects were eventually determined qualified to participate in this study. Thirty-six subjects were female and 26 were male. Ages were from 19 to 81 years. The female mean age was 44 years; the male mean age was 42 years. Without exception

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[6]Part II, questions 5, 10, and 11 (Appendix B) were eliminated from the Dizzy Patient Questionnaire as possible variables contained in the questions seemed not to be relevant to this study.

their primary reason for seeking professional consultation was for "dizziness," and the disturbance ranged from mild loss of equilibrium to severe attacks that required hospitalization.

DEFINITION OF "NORMAL" AND "ABNORMAL" AUDIOLOGIC TEST RESULTS

For purposes of this study, the definition of "normal" and "abnormal" hearing for pure tone air conduction thresholds, pure tone bone conduction thresholds, speech reception threshold, and speech discrimination tests have been defined according to standards established by the Veteran's Administration (Appendix D).

The SISI (Short Increment Sensitivity Index) test scores have been defined as normal or abnormal according to Yantis and Decker (1966) who state that a SISI score of 15% or below should be considered "normal." In an effort at further definition, Jerger (1961) presented the following SISI score ranges:

Negative..... 0 to 15%

Questionable....20 to 50%

Positive.....55 to 100%

For purposes of this study, any SISI score 15% or above was considered to be "abnormal."

Results of the Tone Decay Test have been defined as normal or abnormal by Rosenberg (1958) who classified tone decay (a continuous tone presented at or near threshold

that may fade or "decay" into inaudibility) in this manner:

Normal ..... 0 to 5dB

Mild decay .....10 to 15dB

Moderate decay .....20 to 25dB

Marked tone decay ...30dB plus

The author considered any subject who exhibited a tone decay of 20dB or more at any frequency tested during a 60-second presentation to be "abnormal."

AUDIOLOGICAL TESTING EQUIPMENT AND TESTS

A two-channel Beltone (Model 15CX) pure tone clinical audiometer with bone conduction, SISI unit, wide and narrow band masking generator was used. A professionally designed sound suite[7] and Auraldome ear phones were in use during all testing.

After instruction the patient signaled his responses through the use of a push-button which activated a light on the audiometer panel. The push-button was used as a signal response to pure tones in the air conduction, bone conduction, SISI, and tone decay tests according to the Hughson-Westlake (1944) method of pure tone testing. Verbal responses were required for completion of the speech reception threshold and discrimination tests as per standard audiological testing procedures.

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[7]International Acoustics Company.

The speech reception threshold was determined by using the Spondee W-2 list (Appendix E). It was presented by tape into the head phones and the patient responded verbally (repeated the words he heard) until attenuation reached a level at which the patient understood 50% of the words.

The test for speech discrimination ability utilized 50 phonetically balanced words, W-22 list 1A and 2A (Appendix E). The test was presented by tape 40dB above the sound level of hearing for speech. The patient responded verbally, and the score for this test was determined according to the percentage of words repeated correctly.

The SISI test was channeled through the pure tone audiometer. It was presented at 500 Hz, 1000 Hz, and 4000 Hz at 20dB above threshold as previously determined by the pure tone air conduction test.

No special equipment for the Tone Decay Test (Rosenberg method) was used other than the Beltone audiometer and an accurate stop watch to time the 60-second maximum duration of the test. The tone decay test was presented at 5dB above threshold at 500 Hz, 1000 Hz, and 4000 Hz. The patient was asked to activate the push-button as long as he heard the tone at the particular frequency being tested, and to release the push-button when the tone faded out or stopped. Attenuation was then increased

immediately by 5dB and the test proceeded in this manner for 60 seconds. If the amount of decay exceeded 20dB from the original dB starting point, the patient was considered to have an abnormal tone decay.

Air and bone conduction testing were also performed. The patient activated the push-button when he heard the tone, and released the push-button when the tone was not heard.

ANALYSIS OF THE DATA

The data were sorted using a NCR computer programmed for FORTRAN. The procedure was designed to sort Dizzy Patient Questionnaire answers, Classification decisions, Type decisions, and "normal" and "abnormal" audiologic testing results.

The computer used in this investigation is the property of Clark County School District, Las Vegas, Nevada (Vocational-Technical High School, Data Processing Department). The FORTRAN program was designed and operated by Mr. Jan Provenza, programmer and computer specialist of that facility.

After decisions concerning each subject's sex, Classification and Types of dizziness, and "normal" and "abnormal" results for each of the six audiologic tests were noted, the information was key punched on to data processing cards (Standard Form #DD5081). The completed

card held a total of 11 columns of information. See Table 1 for data card composition.

Through a series of subroutines, cards were processed so that Classification and Types of dizziness were compared with the normal or abnormal results of each of the six audiologic tests. The program was also designed to separate female and male subjects and to print-out the proper information relating to sex for the mixed group.

Table 1

Data Card Structure

Column I	Peripheral
	Central
	Other
Column II	Objective
Column III	Subjective
Column IV	Dizzy
Column V	Air Conduction
Column VI	Phonetically Balanced Words
Column VII	Speech Reception Threshold
Column VIII	Bone Conduction
Column IX	SISI
Column X	Tone Decay
Column XI	Sex

It should be noted that while the original subject sample consisted of 62 subjects, 107 "scans" resulted. Only one Classification of dizziness was designated by the investigator (Table 1, Column I), but the Types of dizziness (Table 1, Columns II, III, and IV) could be Objective or Subjective or Dizzy; Objective and Subjective; Objective and Dizzy; Subjective and Dizzy; or, Objective and Subjective and Dizzy. The computer sorting procedure was designed to process each Classification choice independently against each Type choice and the audiologic test results. Forty-five additional analyses were therefore produced due to the scanning of Columns II, III, and IV, or any combination thereof, against Columns V through XI. For the remainder of this narrative, when the author speaks of the number of subjects, she will be referring to 62. When she speaks of computer "scans," she will be referring to 107 (mixed sample), 73 (female sample), and 34 (male sample).

Percentages carried out to the nearest one-hundredth were the analytical method of choice. Because of the introductory and clinical nature of the data, it seemed that comparative percentages was the method most adaptable to the divergent groups of Classification, Types, and audiologic result data supplied by the computer. For the remainder of this investigation:

Let N^1 = 107 (total Female-Male scans)

Let N^2 = 73 (total Female scans)

Let N^3 = 34 (total Male scans)

Through the use of percentages, Classification of dizziness (Peripheral, Central, or Other), Types of dizziness (Objective and/or Subjective and/or Dizzy), and normal and abnormal audiologic test results were compared against N^1, N^2, and N^3.

An electronic desk calculator, Monroe Model 1500, was used to determine the percentages.

Chapter 3

RESULTS

RESULTS OF N^1--CLASSIFICATION AND TYPE BY PERCENTAGES

As previously stated, 107 scans (N^1) resulted from a 62-subject population. Table 2 represents N^1 sorted into Classification and Types of dizziness before normal and abnormal audiological test results were determined. Refer to Appendix F, Table 10, Section I, for figure sources.

The N^1 scan percentages indicate that the most frequent Classification of dizziness was Peripheral. Total Peripheral Classification was 79.44% of N^1. The most common Type of dizziness was Dizzy (lightheadedness and/or swimming sensation in the head), which equaled 39.25% of N^1. Subjective dizziness (the feeling that the subject is whirling in space) equaled 21.50% of N^1. Objective dizziness (the feeling that the world is moving around the subject) equaled 18.69% of N^1.

Total Central Classification equaled 14.95% of N^1. The most common Type of dizziness was Dizzy, which equaled 08.41% of N^1. Subjective dizziness equaled 04.47% and Objective dizziness equaled only 01.87% of N^1.

Table 2

Classification and Type Percentages--N^1 = 107 Scans

Classification	Type	Scan Total	% of N^1	
Peripheral	Objective	20	18.69%	
Peripheral	Subjective	23	21.50%	
Peripheral	Dizzy	42	39.25%	
				Total Peripheral N^1 = 79.44%
Central	Objective	2	01.87%	
Central	Subjective	5	04.67%	
Central	Dizzy	9	08.41%	
				Total Central N^1 = 14.95%
Other	Objective	1	0.93%	
Other	Subjective	1	0.93%	
Other	Dizzy	4	03.74%	
				Total Other N^1 = 05.61%

Total Objective N^1 = 21.50%
Total Subjective N^1 = 27.10%
Total Dizzy N^1 = 51.40%

Total Other Classification equaled 05.61% of N^1. The most common Type of dizziness was Dizzy, which equaled 03.74% of N^1. Subjective and Objective dizziness each equaled 0.93% of N^1.

The Classification category showing the highest percentage was Peripheral, which equaled 79.44% of N^1. The Type sub-category showing the highest percentage was Dizzy, which equaled 51.40% of N^1.

However, there were further Classification and Types relationships beyond the high Peripheral-Dizzy trend illustrated in Table 2 when single and multiple choices of Types of dizziness by subject were related to that subject's Classification. Table 3 illustrates single and multiple Types choices and their relationships, numerically and by percentages, to the Classification category of a subject or subjects. The N^1 subject percentages indicate that the most frequent Classification of dizziness remained Peripheral, but the most common Types of dizziness was a combination choice of Dizzy, Subjective.

The computer sorting procedure matched a subject's normal and abnormal audiologic results with the Classification and Types of dizziness. Appendix F, Section II, defines the normal and abnormal scan figures for each audiologic test as they relate to Classification and Types of dizziness. Table 4 reproduces those figures in percentages.

Table 3

Relationship of Classification and Single and Multiple Types--N = 62 Subjects

Type(s)	Peripheral		Central		Other		Total Type	
	# of Subjects	% of Sample	# of Subjects	% of Sample	# of Subjects	% of Sample	#	%
Dizzy	13	20.97	4	06.45	2	03.24	19	30.64
Dizzy, Objective	8	12.90	1	0.16	0	---	9	14.52
Dizzy, Subjective	15	24.19	4	06.45	1	01.61	20	32.26
Dizzy, Objective, Subjective	8	12.90	1	0.16	0	---	9	14.52
Objective	4	06.45	0	---	1	01.61	5	08.06
TOTALS	48	77.41%	10	16.13	4	06.46	62	

Table 4

Classification and Type Audiologic Results--Normal and Abnormal--N[1] = 107

	A.C.[a]		SRT[b]		PB'S[c]		B.C.[d]		SISI[e]		T.D.[f]	
	N[g]	Ab.[h]	N	Ab.	N	Ab.	N	Ab.	N	Ab.	N	Ab.
Classification												
Peripheral	45.79	33.65	68.22	11.22	51.40	28.04	53.27	26.17	59.81	19.63	72.90	06.54
Central	04.81	06.54	13.08	01.87	11.21	03.74	08.41	06.54	11.21	03.74	13.08	01.87
Other	04.67	0.94	04.67	0.94	05.61	0.00	05.61	0.00	05.61	0.00	05.61	0.00
Type												
Objective	14.02	07.48	19.63	01.87	18.69	02.80	14.02	07.48	14.02	07.48	19.61	01.87
Subjective	17.76	09.35	23.36	03.74	16.82	10.28	20.56	06.54	22.43	04.67	26.17	0.94
Dizzy	27.10	24.30	42.99	08.41	32.71	18.70	32.71	18.69	40.19	11.21	45.79	05.60

[a] Air Conduction
[b] Speech Reception Threshold
[c] Phonetically Balanced Words
[d] Bone Conduction
[e] Short Increment Sensitivity Index
[f] Tone Decay
[g] Normal
[h] Abnormal

RESULTS OF N^2--CLASSIFICATION AND TYPE BY PERCENTAGES

Seventy-three scans resulted from a 36-subject female sample. Table 5 represents female Classification and Type of analysis of dizziness before normal and abnormal audiologic test results were determined. Refer to Appendix G, Table 11, Section I, for figure sources.

The N^2 percentages indicate that the most outstanding Classification of dizziness was Peripheral. Total Peripheral Classification equaled 84.93% of N^2. The most common Type of dizziness was Dizzy, Subjective, which equaled a total of 67.12% of N^2. Objective dizziness equaled 17.81% of N^2.

Total Central Classification equaled 12.33% of N^2. The most common Type of dizziness was of equal significance for both Subjective and Dizzy Type, each equaling 05.48% of N^2. Objective dizziness equaled 01.47% of N^2.

Total Other Classification equaled 01.74% of N^2 with Subjective and Dizzy Type each equaling 01.37% of N^2. Objective Type demonstrated no individual in this Classification and was therefore 0% of N^2.

The computer sorting procedure made it possible to match N^2 Classification and Type information with normal and abnormal results of the six audiologic tests. Appendix G, Table 11, Section II, defines the base numbers. Table 5 reproduces Table 11, Section II, in percentage

Table 5

Classification and Type Percentages--N^2

Classification	Type	Scan Total	% of N^2	
Peripheral	Objective	13	17.81%	
Peripheral	Subjective	19	26.03%	
Peripheral	Dizzy	30	41.09%	Total Peripheral N^2 = 84.93%
Central	Objective	1	01.37%	
Central	Subjective	4	05.48%	
Central	Dizzy	4	05.48%	Total Central N^2 = 12.33%
Other	Objective	0	0.00%	
Other	Subjective	1	01.37%	
Other	Dizzy	1	01.37%	Total Other N^2 = 02.74%

Total Objective N^2 = 19.18%
Total Subjective N^2 = 32.88%
Total Dizzy N^2 = 47.94%

Table 6

Classification and Type Audiologic Results--Normal and Abnormal--N^2 = 73

	A.C.		SRT		PB'S		B.C.		SISI		T.D.	
	N	Ab.	N	Ab.	N	Ab.	N	Ab.	N	Ab.	N	Ab.
Classification												
Peripheral	57.53	27.40	73.97	10.96	56.16	28.77	67.12	17.81	71.23	13.70	79.45	05.48
Central	09.59	02.74	12.33	0.00	09.59	02.74	09.59	02.74	09.59	02.74	12.33	0.00
Other	02.74	0.00	02.74	0.00	02.74	0.00	02.74	0.00	02.74	0.00	02.74	0.00
Type												
Objective	13.70	05.48	15.07	04.11	15.07	04.11	13.70	05.48	13.70	05.48	17.81	01.37
Subjective	24.66	08.21	30.14	02.74	21.91	10.96	28.77	04.11	30.14	02.74	32.88	0.00
Dizzy	31.51	16.44	42.47	05.47	31.51	16.44	36.98	10.96	42.46	05.48	43.83	04.11

results as they relate to the normal and abnormal results of the audiologic tests.

Table 6 illustrates that the higher percentages of abnormality by Classification, Types, and audiologic test is that of Peripheral-Dizzy with the exception of the SISI test. Percentages for this test indicated equal abnormal percentages in each sub-category of Dizzy and Objective Type.

RESULTS OF N^3--CLASSIFICATION AND TYPE BY PERCENTAGES

Thirty-four scans resulted from a 26-subject male sample. Table 7 represents male Classification and Type analysis of dizziness before normal and abnormal audiologic test results were determined. Refer to Appendix H, Table 12, Section I, for figure sources.

The N^3 percentages indicate that the most frequent Classification of dizziness was in the Peripheral category. Total Peripheral Classification was 67.65% of N^3. The most common Types of dizziness was Dizzy, Objective, which equaled a total of 55.88% of N^3. Subjective dizziness equaled 11.77% of N^3.

Total Central Classification equaled 20.59% of N^3. The most common Type of dizziness was Dizzy, which equaled 14.71% of N^3. Objective and Subjective Type of dizziness each equaled 02.94% of N^3.

Table 7

Classification and Type Percentages--N^3

Classification	Type	Scan Total	% of N^3	
Peripheral	Objective	7	20.59%	
Peripheral	Subjective	4	11.77%	
Peripheral	Dizzy	12	35.29%	Total Peripheral N^3 = 67.65%
Central	Objective	1	02.94%	
Central	Subjective	1	02.94%	
Central	Dizzy	5	14.71%	Total Central N^3 = 20.59%
Other	Objective	1	02.94%	
Other	Subjective	0	0.00%	
Other	Dizzy	3	08.82%	Total Other N^3 = 11.76%

Total Objective N^3 = 26.76%
Total Subjective N^3 = 14.71%
Total Dizzy N^3 = 58.53%

Total Other Classification equaled 11.76% of N^3. The most common Type of dizziness was Dizzy, which equaled 08.82% of N^3, followed by Objective dizziness, which equaled only 01.94%. No subject in N^3 placed in the Other-Subjective categories.

After computer sorting, N^3 Classification and Type information was matched against normal and abnormal results of the six audiologic tests. Appendix H, Table 12, Section II, defines the base numbers. Table 8 reproduces Table 12, Section II, in percentages as they relate to the normal and abnormal results of the audiologic tests.

The N^3 sample, as illustrated by Table 8, shows that the higher percentages of abnormality by Classification, Types, and audiologic test is that of Peripheral-Dizzy, Objective. This is different from the N^1 (mixed) and N^2 (female) samples, which both showed a Peripheral Classification (as did N^3--male), but with the larger Type being that of Dizzy, Subjective. The higher percentages for Types in the N^3 sample was Dizzy, Objective. Also, the overall audiologic percentages results vary between the three samples. Table 9 compares the normal-abnormal audiologic test results in a combination of Classification and Types.

Table 8

Classification and Type Audiologic Results--Normal and Abnormal--N^3 = 34

	A.C.		SRT		PB'S		B.C.		SISI		T.D.	
	N	Ab.	N	Ab.	N	Ab.	N	Ab.	N	Ab.	N	Ab.
Classification												
Peripheral	20.59	47.06	55.89	11.76	41.17	26.47	23.53	44.11	35.29	32.35	58.82	08.82
Central	05.88	14.71	14.71	05.88	14.71	05.88	05.88	14.71	08.82	11.77	14.71	05.88
Other	08.82	02.94	08.82	02.94	11.77	0.00	11.77	0.00	11.77	0.00	11.77	0.00
Type												
Objective	14.71	11.76	26.47	0.00	26.47	0.00	14.71	11.76	14.71	11.76	23.53	02.94
Subjective	02.94	11.76	08.82	05.88	05.88	08.82	02.94	11.76	05.88	08.82	11.76	02.94
Dizzy	17.65	41.18	44.12	14.71	35.29	23.53	23.53	35.29	35.29	23.53	50.00	08.82

Table 9

Combined Classification and Type Audiologic Results--N^1, N^2, and N^3

	A.C.		SRT		PB'S		B.C.		SISI		T.D.	
	N	Ab.	N	Ab.	N	Ab.	N	Ab.	N	Ab.	N	Ab.
N^1	58.87	41.13	85.97	14.03	68.32	31.78	67.29	32.71	76.63	23.37	91.59	08.41
N^2	69.86	30.14	89.04	10.96	68.49	31.51	79.45	20.55	83.56	16.44	94.52	05.48
N^3	35.29	64.71	79.42	20.58	67.65	32.35	41.18	58.82	55.88	44.12	85.30	14.70

Table 9 indicates that N^1 is an average of N^2 and N^3 combined, overall results and that the most outstanding differences are apparent when comparing the N^2 (female) and N^3 (male) audiologic results.

Chapter 4

DISCUSSION

It was the intent of this study to determine if, or to what extent, six audiologic tests show relationships with questions or clusters of questions relating to Classification and Types of dizziness. The audiologic tests were pure tone air conduction, speech reception threshold, speech discrimination using phonetically balanced words, pure tone bone conduction, SISI, and tone decay. The Classification of dizziness was categorized as Peripheral, Central, or Other; terms used in describing possible physiological origin of dizziness and determined from answers given by a subject on a Dizzy Patient Questionnaire. Type of dizziness was sub-categorized as Objective, Subjective, or Dizzy, or any combination thereof; descriptions given by a subject on the Dizzy Patient Questionnaire identifying specific sensations of equilibrium disturbance. This study also investigated the possibility of relationships existing between a mixed, an all female, and an all male sample and audiologic test results for Classification categories and Type sub-categories.

The N^1 (mixed) and N^2 (female) samples each indicated a Peripheral (Classification)-Dizzy, Subjective (Types)

trend before the audiologic test results were determined. The N^3 (male) sample indicated a Peripheral (Classification)-Dizzy, Objective (Types) trend before the audiologic test results were determined. The Classification and Types trends for each sample were determined according to the higher percentages of subjects falling into dizzy categories and sub-categories. After the audiologic test results were included the N^1, N^2, and N^3 samples continued, per individual audiologic test, to exhibit Peripheral-Dizzy trends.

The N^1 sample consisted of 62 female and male subjects. This subject sample resulted in 107 scans. Classification percentages, before audiologic test results were determined, were in the following order:

Peripheral 79.44%

Central 14.95%

Other 05.61%

Types percentages, before audiologic test results were determined, were in the following order:

Dizzy 51.40%

Objective 21.50%

Subjective 27.10%

As the normal and abnormal audiologic test results for the N^1 sample were related to Classification and Types, it was found that the highest abnormal percentages for each of the six tests showed a Peripheral-Dizzy trend.

The N^1 sample was a composite of the N^2 and N^3 samples and illustrated mixed subject results for Classification, Types, and normal and abnormal audiologic test results. The N^1 results will be discussed further when the N^2 and N^3 samples are compared to each other and to the N^1 sample by Classification, Types, and audiologic results.

The N^2 sample consisted of 36 female subjects, which totaled 73 scans. Total Classification percentages, before audiologic test results were decided, were in the following order:

Peripheral 84.93%

Central 12.33%

Other 02.74%

Total Types percentages, before audiologic test results were decided, were in the following order:

Dizzy 47.94%

Subjective 32.88%

Objective 19.18%

As the normal and abnormal audiologic test results for the N^2 sample were related to Classification and Types it was found that the highest abnormal percentages for each of the six tests fell into a Peripheral (Classification)-Dizzy (Type) trend (refer to Table 5, p. 24).

The N^3 sample consisted of 26 male subjects, which totaled 34 scans. Total Classification percentages, before

audiologic test results were determined, were in the following order:

Peripheral 67.65%

Central 20.59%

Other 11.76%

Total Types percentages, N^3, before audiologic test results were determined, were in the following order:

Dizzy 58.53%

Objective 26.76%

Subjective 14.71%

Although the N^2 (female) and N^3 (male) samples differed in total by only 10 subjects, the female scans outnumbered male scans by 39. This indicated that female subjects were more inclined to make multiple choices of Types of dizziness when completing the Dizzy Patient Questionnaire. The disparity in scan totals might also suggest that the female sample tested is, for some reason, more susceptible to more complex or at least more complexly designated equilibrium disorder. There could possibly be metabolic, hormonal, chemical, and/or emotional factors that result in the "feeling" of dizziness. Also, the female sample may be more sensitive to the feeling of dizziness and will seek medical diagnosis more readily than the male.

The N^2 sample was more inclined to have multiple choices of Types of dizziness, but the audiologic tests did

not confirm any unusual incidence of hearing abnormality. Table 6 (p. 25) presents abnormal audiologic percentages, per test, in relationships to Classification and Types of dizziness. Related to the already established Peripheral Classification and Dizzy, Subjective Types, the N^2 audiologic data indicate low abnormal percentages (below 20%) in four of the six tests. The higher abnormal audiologic test results for pure tone air conduction, phonetically balanced word discrimination test, and pure tone bone conduction tests would not seem to indicate any particular hearing impairment trend in relationship to the higher incidence of Types of dizziness for the N^2 sample. The abnormal percentages for these tests are all within 10 percent when the percentage figures are compared, test to test. The low abnormal percentages displayed in this sample indicate that although female subjects have higher Types of dizziness (Dizzy and/or Objective and/or Subjective) percentages before audiologic test results are determined (p. 33) there does not seem to be any particular relationship between audiologic test results and the Classification and Types trends of this sample.

The N^3 (male) sample, with a smaller subject and scan total, exhibited higher abnormal percentages in the six audiologic tests when compared with the same tests of the N^2 (female) sample with one exception: phonetically balanced word discrimination scores were slightly (2.30%)

below the N^2 results for that test. Predominant Classification and Types were Peripheral-Dizzy, Objective. Scan totals outnumbered subjects by eight, which indicates that the N^3 sample was less inclined to describe multiple Types of dizziness on the Dizzy Patient Questionnaire. Table V (p. 24) illustrates abnormal audiologic test results in relationship to Classification and Types of dizziness.

Although the N^3 sample was a lower subject and scan total, the audiologic test results showed the highest percentages of abnormality, with the exception previously mentioned, when compared with the other two samples, i.e., N^1 and N^2. This could indicate that male subjects, though less vulnerable to equilibrium disorders than female subjects, exhibit more definite hearing impairment when they do, in fact, develop "dizziness." The higher abnormal audiologic test results for N^3 could be the result of a "male oriented" environment, i.e., high intensity noise employment, military experience, etc., resulting in a higher overall incidence of hearing loss in this population. If this is the case, it only indicates that this sample is representative of the male and has a higher incidence of hearing loss.

Throughout the investigation it was found that the three samples--mixed (N^1), all female (N^2), and all male (N^3)--exhibited the same predominant Classification trend; that of Peripheral, and that the mixed (N^1) and female (N^2)

samples exhibited the same Type trend; Dizzy, Subjective. However, the male sample (N^3) exhibited a Type trend of Dizzy, Objective. The Classification trend indicates that the majority of subjects identified their equilibrium disturbance as having an outer, external, or distal physiology (Peripheral) as opposed to a brain or spinal cord disturbance (Central), or other unidentifiable environmental, chemical, or physiological origins (Other). The most outstanding Type trend, Dizzy, would seem to confirm the manner in which the layman and the specialist both speak of symptoms of space disorientation and that the sub-classifications of Objective (male sample) and Subjective dizziness (female sample) could be important symptoms when analyzing male and female Types. Audiologic test results in relationship to Classification and Types of dizziness showed no outstanding results as per individual test in any of the three samples. This would seem to confirm Winchester's (1966) statement,

> I have not been able to determine or to find any recurrent pattern of a pure tone audiogram, for example, that would correlate well with varying types of vestibular disorders. There just doesn't seem to be much of a correlation there.

However, when comparing the abnormal percentages of the six audiologic tests, sample against sample, it was found that the male sample (N^3) exhibited generally higher abnormal percentages than the mixed (N^1) or all female (N^2) sample. Reasons for this male-related phenomenon

are not definable at this time, and the need for further research in the area of male dizzy patients is indicated.

Chapter 5

SUMMARY AND CONCLUSIONS

Thirty-six female and 26 male subjects, all seeking relief from a dizzy syndrome, were selected as subjects for this experiment, and were requested to complete a Dizzy Patient Questionnaire. Following that they were given six audiologic tests commonly used for diagnosis of middle, inner ear, and retrocochlear impairment. Dizzy Patient Questionnaire answers were used to define Classification (Peripheral, Central, or Other) categories and Types of dizziness (Objective and/or Subjective and/or Dizzy) subcategories. Classification and Types of dizziness were further compared to "normal" and "abnormal" audiologic test results for each of the six tests. Three distinct samples were investigated in this manner; mixed, all female, and all male. Conclusions were based upon Classification and single or multiple Types trends evaluated by percentages, and the relationships of Classification and Types of dizziness to the abnormal results of the six audiologic tests.

Peripheral-Dizzy trends were construed as dominant in each of the samples, both before and after audiologic test results were related to these data. Further Types

analysis revealed that the N^1 (mixed) sample and N^2 (female) sample were mostly in the Dizzy, Subjective sub-categories and that the N^3 (male) sample was mostly in the Dizzy, Objective sub-category. Also, higher percentages of hearing abnormality were found in the male sample. However, these abnormal audiologic test percentages could not be related to Classification and Types of dizziness. It is suggested that there is need for further research to define why male dizzy patients exhibit higher percentages of abnormality audiologically than a mixed or an all female group and to define why the male sample exhibited a different sub-type of dizziness (Dizzy, Objective as opposed to Dizzy, Subjective) than the female sample.

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APPENDICES

APPENDIX A

DIZZINESS QUESTIONNAIRE

Name _____

Date _____

THE DIZZY PATIENT--SHEEHY

I. When you are "dizzy" do you experience any of the following sensations? Please read the entire list first. Then circle yes or no to describe your feelings most accurately.

YES	NO	1. Lightheadedness.
YES	NO	2. Swimming sensation in the head.
YES	NO	3. Blacking out.
YES	NO	4. Loss of consciousness.
YES	NO	5. Tendency to fall:
YES	NO	To the right?
YES	NO	To the left?
YES	NO	Forward?
YES	NO	Backward?
YES	NO	6. Objects spinning or turning around you.
YES	NO	7. Sensation that you are turning or spinning inside, with outside remaining stationary.
YES	NO	8. Loss of balance when walking:
YES	NO	Veering to the right?
YES	NO	Veering to the left?
YES	NO	9. Headache.
YES	NO	10. Nausea or vomiting.
YES	NO	11. Pressure in the head.

II. Please circle yes or no and fill in the blank spaces.

YES	NO	1. My dizziness is constant? In attacks?
		2. When did dizziness first occur? _____
		_____
		3. If in attacks, how often? _____
		_____

How long do they last? _____

Do you have any warning that the attack is about to start? _____

YES NO 4. Are you completely free of dizziness between attacks?
YES NO 5. Does change of position make you dizzy?
YES NO 6. Do you have trouble walking in the dark?
YES NO 7. When you are dizzy, must you support yourself when standing?
YES NO 8. Do you know of any possible cause of your dizziness? What? _____
YES NO 9. Do you know of anything that will:
YES NO Stop your dizziness or make it better?
YES NO Make your dizziness worse?
YES NO Precipitate an attack?
YES NO 10. Were you exposed to any irritating fumes, paints, etc. at the onset of dizziness?
YES NO 11. Do you have any allergies?
YES NO 12. Did you ever injure your head?
YES NO Were you unconscious?
YES NO 13. Do you take any medications regularly?
What? _____
YES NO 14. Do you use tobacco in any form?
How much? _____

III. Do you have any of the following symptoms? Circle yes or no and circle ear involved.

YES NO 1. Difficulty in hearing? Both Right Left
YES NO 2. Noise in your ears? Both Right Left
Describe the noise. _____
Does noise change with dizziness? If so, how? _____
YES NO 3. Fullness or stuffiness in your ears? Both Right Left
YES NO Does this change when you are dizzy?
YES NO 4. Pain in your ears? Both Right Left
YES NO 5. Discharge from your ears? Both Right Left

IV. Have you experienced any of the following symptoms? Please circle yes or no.

YES NO 1. Double vision.
YES NO 2. Numbness of face or extremities.
YES NO 3. Blurred vision or blindness.
YES NO 4. Weakness in arms or legs.

YES NO 5. Clumsiness in arms or legs.
YES NO 6. Confusion or loss of consciousness.
YES NO 7. Difficulty with speech.
YES NO 8. Difficulty with swallowing.

APPENDIX B

REVISED DIZZINESS QUESTIONNAIRE

Name _____

Date _____

THE DIZZY PATIENT

I. When you are "dizzy" do you experience any of the following sensations? Please read the entire list first. Then circle yes or no to describe your feelings most accurately.

YES	NO	1.	Lightheadedness.
YES	NO	2.	Swimming sensation in the head.
YES	NO	3.	Blacking out.
YES	NO	4.	Loss of consciousness.
YES	NO	5.	Tendency to fall.
YES	NO	6.	Objects spinning or turning around you.
YES	NO	7.	Sensation that you are turning or spinning inside, with outside remaining stationary.
YES	NO	8.	Loss of balance when walking.
YES	NO	9.	Headache.
YES	NO	10.	Nausea or vomiting.
YES	NO	11.	Pressure in the head.

II. Please circle yes or no.

YES	NO	1.	My dizziness is constant?
YES	NO		In attacks?
YES	NO	2.	Are you completely free of dizziness between attacks?
YES	NO	3.	Does change of position make you dizzy?
YES	NO	4.	Do you have trouble walking in the dark?
YES	NO	5.	When you are dizzy, must you support yourself when standing?
YES	NO	6.	Do you know of any possible cause of your dizziness?
			Do you know of anything that will:

YES NO 7. Stop your dizziness or make it better?
YES NO 8. Make your dizziness worse?
YES NO 9. Precipitate an attack?
YES NO 10. Were you exposed to any irritating fumes, paints, etc. at the onset of dizziness?
YES NO 11. Do you have any allergies?
YES NO 12. Did you ever injure your head?
YES NO Were you unconscious?
YES NO 13. Do you take any medications regularly?
YES NO 14. Do you use tobacco in any form?

III. Do you have any of the following symptoms? Circle yes or no.

YES NO 1. Difficulty in hearing?
YES NO 2. Noise in your ears?
YES NO 3. Does noise change with dizziness?
YES NO 4. Fullness or stuffiness in your ears?
YES NO Does this change when you are dizzy?
YES NO 5. Pain in your ears?
YES NO 6. Discharge from your ears?

IV. Have you experienced any of the following symptoms? Circle yes or no.

YES NO 1. Double vision.
YES NO 2. Numbness of face or extremities.
YES NO 3. Blurred vision or blindness.
YES NO 4. Weakness in arms or legs.
YES NO 5. Clumsiness in arms or legs.
YES NO 6. Confusion or loss of consciousness.
YES NO 7. Difficulty with speech.
YES NO 8. Difficulty with swallowing.

APPENDIX C

CLASSIFICATION OF DIZZY PATIENT QUESTIONNAIRE QUESTIONS

	Peripheral	Central	Other
Part I	1. 2. 6. 7.	3. 4. 5. 6. 7. 8.	9. 10. 11.
Part II	2. 4. 12.	1. 14.	3. 6. 7. 8. 9.
Part III	1. 2. 3. 4. 5. 6. 7.		
Part IV		1. 2. 3. 4. 5. 6. 7. 8.	

APPENDIX D

THE VA AUDIOMETRIC DEFINITION OF "HEARING WITHIN NORMAL LIMITS"

Based on ASA-1954 Reference Levels for Normal Thresholds

1. The Speech Reception Threshold is less than 16dB.

and

2. The Discrimination Score is higher than 92%.

and

3. The Pure Tone Thresholds at 250, 500, 1000, 2000, and 4000 Hz are all less than 30dB.

and

4. The thresholds for at least three of these frequencies are 15dB or less.

APPENDIX E

SPONDEE WORDS LIST A AND PHONETICALLY BALANCED WORDS (PB 50) W-22

SPONDEE WORDS LIST A

1.	greyhound	13.	padlock	25.	playground
2.	schoolboy	14.	mushroom	26.	woodwork
3.	inkwell	15.	hardware	27.	oatmeal
4.	whitewash	16.	workshop	28.	toothbrush
5.	pancake	17.	horseshoe	29.	farewell
6.	mousetrap	18.	armchair	30.	grandson
7.	eardrum	19.	baseball	31.	drawbridge
8.	headlight	20.	stairway	32.	doormat
9.	birthday	21.	cowboy	33.	hothouse
10.	duckpond	22.	iceberg	34.	daybreak
11.	sidewalk	23.	northwest	35.	sunset
12.	hotdog	24.	railroad		

PHONETICALLY BALANCED WORDS (PB 50) W-22

List 1-A

1.	an	14.	low	27.	as	40.	jam
2.	yard	15.	owl	28.	wet	41.	poor
3.	carve	16.	it	29.	chew	42.	him
4.	us	17.	she	30.	see	43.	skin
5.	day	18.	high	31.	deaf	44.	east
6.	toe	19.	there	32.	them	45.	thing
7.	felt	20.	earn	33.	give	46.	dad
8.	stove	21.	twins	34.	true	47.	up
9.	hunt	22.	could	35.	isle	48.	bells
10.	ran	23.	what	36.	or	49.	wire
11.	knees	24.	bathe	37.	law	50.	ache
12.	not	25.	ace	38.	me		
13.	mew	26.	you	39.	none		

List 2-A

1. yore
2. bin
3. way
4. chest
5. then
6. ease
7. smart
8. gave
9. pew
10. ice
11. odd
12. knee
13. move
14. now
15. jaw
16. one
17. hit
18. send
19. else
20. tare
21. does
22. too
23. cap
24. with
25. air
26. and
27. young
28. cars
29. tree
30. dumb
31. that
32. die
33. show
34. hurt
35. own
36. key
37. oak
38. new
39. live (verb)
40. off
41. ill
42. rooms
43. ham
44. star
45. ear
46. thin
47. flat
48. well
49. by
50. ail

APPENDIX F

Table 10

Female-Male Combined--N[1] = 107

Section I			
	Female	Male	Total
Peripheral Objective	13	7	20
Peripheral Subjective	19	4	23
Peripheral Dizzy	30	12	42
Central Objective	1	1	2
Central Subjective	4	1	5
Central Dizzy	4	5	9
Other Objective	0	1	1
Other Subjective	1	0	1
Other Dizzy	1	3	4

Table 10 (cont'd.)

Section II													
	A.C.		SRT		P.B.'S		B.C.		SISI		T.D.		Total
	N	Ab.	N	Ab.	N	Ab.	N	Ab.	N	Ab.	N	Ab.	
Peripheral Objective	13	7	18	1	17	3	13	7	13	7	19	1	120
Peripheral Subjective	15	8	20	3	14	9	18	5	19	4	22	1	138
Peripheral Dizzy	21	21	35	7	24	18	26	16	32	10	37	5	252
Central Objective	1	1	2	0	2	0	1	1	1	1	1	1	12
Central Subjective	3	2	4	1	3	2	3	2	4	1	5	0	30
Central Dizzy	5	4	8	1	7	2	5	4	7	2	8	1	54
Other Objective	1	0	1	0	1	0	1	0	1	0	1	0	6
Other Subjective	1	0	1	0	1	0	1	0	1	0	1	0	6
Other Dizzy	3	1	3	1	4	0	4	0	4	0	4	0	24
TOTALS	63	44	92	15	73	34	72	35	82	25	98	9	

APPENDIX G

Table 11

Female Subjects Only--N^2 = 73

Section I	
	Female
Peripheral Objective	13
Peripheral Subjective	19
Peripheral Dizzy	30
Central Objective	1
Central Subjective	4
Central Dizzy	4
Other Objective	0
Other Subjective	1
Other Dizzy	1

Table 11 (cont'd.)

	Section II												
	A.C.		SRT		P.B.'S		B.C.		SISI		T.D.		Total
	N	Ab.	N	Ab.	N	Ab.	N	Ab.	N	Ab.	N	Ab.	
Peripheral Objective	9	4	11	2	10	3	9	4	9	4	12	1	78
Peripheral Subjective	14	5	17	2	12	7	17	2	17	2	19	0	114
Peripheral Dizzy	19	11	26	4	19	11	23	7	26	4	27	3	180
Central Objective	1	0	1	0	1	0	1	0	1	0	1	0	6
Central Subjective	3	1	4	0	3	1	3	1	4	0	4	0	24
Central Dizzy	3	1	4	0	3	1	3	1	4	0	4	0	24
Other Objective	0	0	0	0	0	0	0	0	0		-	0	0
Other Subjective	1	0	1	0	1	0	1	0	1		1	0	6
Other Dizzy	1	0	1	0	1	0	1	0	1		1	0	6
TOTALS	51	22	65	8	50	23	58	15	63		69	4	

APPENDIX H

Table 12

Male Subjects Only--N^3 = 34

Section I	
	Male
Peripheral Objective	7
Peripheral Subjective	4
Peripheral Dizzy	12
Central Objective	1
Central Subjective	1
Central Dizzy	5
Other Objective	1
Other Subjective	0
Other Dizzy	3

Table 12 (cont'd.)

	Section II												
	A.C.		SRT		P.B.'S		B.C.		SISI		T.D.		Total
	N	Ab.	N	Ab.	N	Ab.	N	Ab.	N	Ab.	N	Ab.	
Peripheral Objective	4	3	7	0	7	0	4	3	4	3	7	0	42
Peripheral Subjective	1	3	3	1	2	2	1	3	2	2	3	1	24
Peripheral Dizzy	2	10	9	3	5	7	3	9	6	6	10	2	72
Central Objective	0	1	1	0	1	0	0	1	0	1	0	1	6
Central Subjective	0	1	0	1	0	1	0	1	0	1	1	0	6
Central Dizzy	2	3	4	1	4	1	2	3	3	2	4	1	30
Other Objective	1	0	1	0	1	0	1	0	1	0	1	0	6
Other Subjective	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Dizzy	2	1	2	1	3	0	3	0	3	0	3	0	18
TOTALS	12	22	27	7	23	11	14	20	19	15	29	5	